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Precision Spectroscopy of Polarized Molecules in an Ion Trap¹

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To realize the advantages that molecules offer to a measurement of the electron's electric dipole moment (eEDM), one must apply an electric field large enough to polarize the molecule in the lab frame. We show that via the use of a rotating bias field, this can be accomplished for trapped molecular ions. We observe coherence times in excess of 150 ms on the science transition in trapped ionic hafnium fluoride. We characterize some of effects limiting the realization of still longer coherence times. We discuss the implications for an improved eEDM measurement. The work was done in collaboration with Will Cairncross, Kevin Cosell, Dan Gresh, Matt Grau, Huanqian Loh, Ed Meyer, Kang-Kuen Ni, Yiqi Ni, John Bohn and Jun Ye.

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